

# MONKEYS OF THE OLD CITY OF JAIPUR, INDIA<sup>1</sup>

REENA MATHUR, R. MANOHAR AND A. LOBO<sup>2</sup>  
(With two text-figures)

This report presents preliminary data on the density of *Macaca mulatta* and *Presbytis entellus* based on road transects in the city of Jaipur, India. The sampled area covered 7.8% of the total area of the old city of Jaipur. Transects were run during the morning hours of the winter season. The results indicate a much higher density of *Macaca mulatta* than of *Presbytis entellus* (346.4 and 36.6 per sq. km respectively). The number of rhesus groups in 7.26 sq. km is 21, while that of langurs is 5. The higher density of *M. mulatta* is attributed to its omnivorous and terrestrial habits. *P. entellus* is folivorous and arboreal; its habitat requirements are best met in the city's outskirts. In the old city they are mainly found in the temple areas. This investigation suggests that the monkeys in the inner old city should be managed by rehabilitation into the forest before they outstrip food supply and living space, and before they are treated more and more as pests by city inhabitants.

## INTRODUCTION

The present study is the outcome of a longfelt desire to take up census survey of primates of a city which has an abundance of two monkey species.

Monkeys are abundant in Jaipur, but there are very few reports on their population density and structure (Prakash 1962, Wolfe and Mathur 1987). The present investigation (October 1985 to February 1986) was initiated to provide preliminary information on the density of *M. mulatta* and *P. entellus* within the city.

## STUDY AREA

The city of Jaipur (26°55'N and 70°55'E) lies within the semi-arid zone. The climate is sub-tropical and characterized by three distinct seasons, with almost all rain falling from July to September, the annual rainfall being 70 cm. The winter season extends from October to February with temperature dropping to about 4°C. The summers are dry and hot, and temperatures may reach as high as 45°C. The total city area (urban agglomeration) is 210.09 sq.km and has a human population of 1,015,160 (density 4832 per sq.km). The city is divisible into an inner old city and a surrounding new city. Of particular interest in the present investigation is the old city which encompasses an area of 7.26 sq. km and has a high human density (33,480 per sq.km). This

area has markets, tourist spots and residences.

For this study, ten roads were selected as the sample for density estimates in the old city (4 east-west, 6 north-south; Fig. 1). These roads were selected as transects because of the ease with which the monkeys could be counted. Hence the sample is not entirely random. Each transect was 1 km long (total 10 km). All transects except the sixth had a fixed width. Their widths were estimated by taking into account (i) width of the road, (ii) width of the pavements on both sides of the road, (iii) width of the shops on both sides, and (iv) parts of houses seen beyond the shops. Transect 6 was of the same length as the others but on each trip the transect width was determined by estimating the perpendicular distance of the animal farthest from the road. The mean value of all these widths provided the approximate width of transect 6. The area of each transect was calculated by multiplying transect width by length. The sampled area covered 7.83% of the total area of the old city (7.26 sq km).

## METHODS

Each transect was run 20 times at a fixed time of the day (0630 hrs.). The direction of movement along each of the transects was the same during all visits. On each survey the investigators drove along these road transects on a two wheeler (monkeys here are habituated to all urban noises) at slow speed (15 km/hour), stopping whenever there were monkeys to count, individuals and groups of both species. All precautions were taken not to count any individual twice. The following sequence of transect censuses was followed: transects 1, 5, 8, 2, 6, 9, 3, 7, 10, 4

<sup>1</sup>Accepted April 1988.

<sup>2</sup>Department of Zoology, University of Rajasthan, Jaipur 302 004.

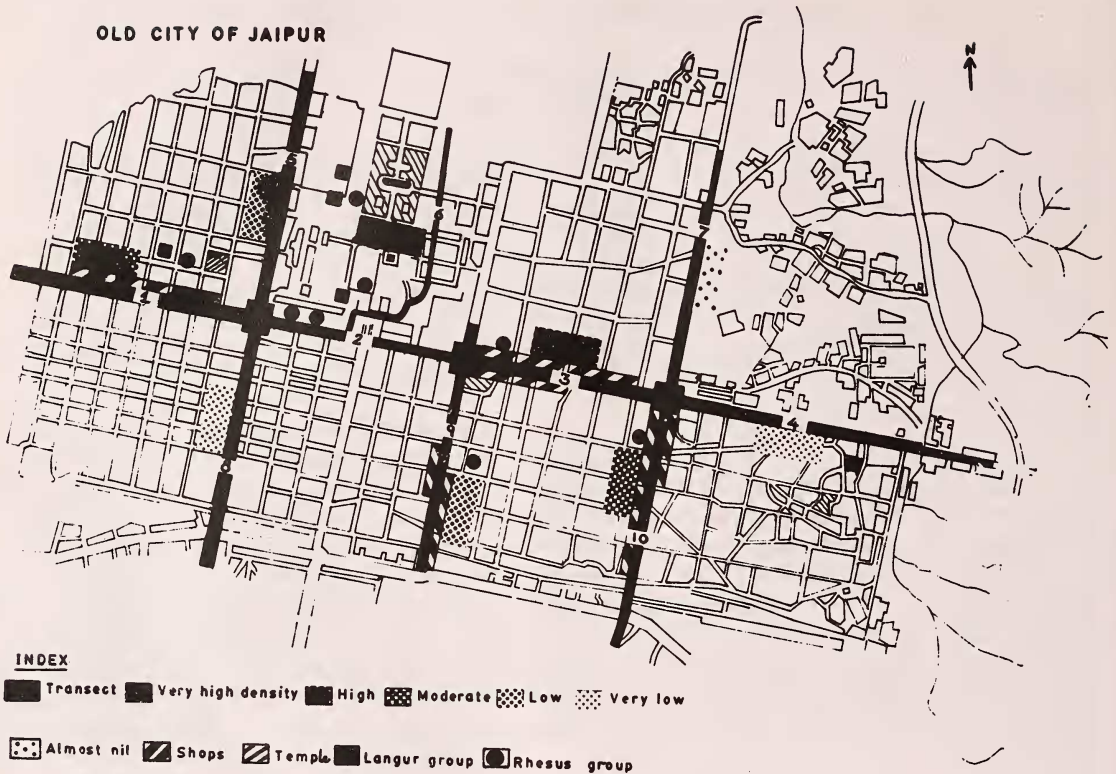


Fig. 1. Distribution and density of monkeys along the transects and its association with provisioning sites.

(Fig. 1). This sequence was established to avoid the possibility of counting individuals twice and was based on a consideration of the movement of monkeys along the transects. Collectively, the transects covered a total area of 0.57 sq.km (56.94 ha). This method provided a quick estimate of primate density in the study area. The total survey time was 160 man hours; the cumulative transect length was 200 km, and the total survey area was 7.26 sq.km.

Driving a vehicle slowly on the road is probably the best way to census monkeys in the city. Monkeys sometimes keep moving rather rapidly in the same direction; if the transect is walked, monkeys may pass the investigator and be counted twice.

Long broad roads were chosen for the transects because on narrow, congested lanes the houses are very close and monkeys easily jump from one house to another and even from one lane to another, thus

increasing the chances of counting the same monkey twice. Morning hours during the winter months are the best time to count monkeys in Jaipur because most individuals are huddled together and sit basking on the rooftops.

## RESULTS

The total density of monkeys in the old city of Jaipur is 383.0/sq.km. Langurs contribute a very small fraction to this total, i.e. 36.6/sq.km. The remaining 356.4 is constituted by rhesus monkeys alone (relative density 0.12 and 0.88 respectively).

Twenty-one rhesus and five langur groups were encountered and identified. Biomass calculations show that mean weight per sq.km for langurs is 522 kg while for rhesus it is 3117.6 kg (X wts. Prater 1980, Napier and Napier 1967). This suggests that, within the inner city, food is much more util-

ized by rhesus than by langur. Whether calculated on the basis of number of individuals or biomass per sq.km., rhesus are clearly dominant in the inner city.

The maximum mean number of rhesus and langurs ( $175.3 \pm 14.3$  and  $34.6 \pm 2.2$  respectively) was found in transect 6. Rhesus were seen in all 10 transects, whereas langurs were absent in transects 5, 7, 9 and 10 (Fig. 2).

Therefore, the frequency of sighting langurs is as low as 0.6 and that of rhesus is 1.0. If transect 6 is excluded from the analysis, density estimates are reduced from 383.0 to 278.5 monkeys/sq. km. ( $262.1$  rhesus/sq.km and  $16.4$  langurs/sq.km). Transect 6 is the only transect which includes a temple, where people not only protect animals but also feed them.

DISCUSSION

The spatial distribution of *M. mulatta* and *P. entellus* in the city of Jaipur is distinct. The old city has a very high density of rhesus; though they

are found all over the old city, their greatest concentration is in transect 6 because of the presence of a temple and a tourist spot in that area. The concentration of rhesus in the old city is attributed to their omnivorous, terrestrial feeding habits and more aggressive nature. They raid shops and pilfer goods from people. The distribution of langurs is restricted mainly to transect 6 (temple-tourist area) probably because more vegetation is found there (as compared to the rest of the old city). In brief, both species are most abundant in temple-tourist area because of protection generally offered to them. In other areas of the old city the rhesus is found as mentioned earlier but sighting a langur group is rather rare. The shop keepers and vendors keep chasing monkeys away. The rhesus, which is more aggressive, withstands this, while langurs flee.

The distribution and density of *M. mulatta* along the road transects has a close association with the wholesale fruit, vegetable, grain and jaggery shops (Fig. 1; Table 1). *M. mulatta* would often be found concentrated around these shops. The highest concentration of *M. mulatta* and *P. entellus* at transect 6 is probably due to the facts that (i) the transect passes through the area of a large temple where provisioning is high, (ii) there are few residential houses along this transect, so that monkeys are seldom chased or otherwise harassed, and (iii) the area has many trees to give refuge to both species and provide food to langurs. Otherwise, langur groups are generally seen on the city outskirts, probably due to two reasons: (i) there is virtually no confrontation with the more aggressive rhesus, and (ii) the outskirts provide more food (leaves, fruits etc) of the type eaten by the langurs.

After talking to inhabitants of the old city and completing the density study, the authors support suggestions made by Southwick and Siddiqi (1983, 1984) that excess numbers of monkeys should be translocated from areas of high human population. This is necessary to protect both the monkeys and the people from mutual harassment and reduce the potential of disease transmission (Mohnot 1978, Hall 1955) and also to reduce human influence on monkeys (Neomi *et al.* 1981).

MEAN NUMBER OF MONKEYS IN EACH TRANSECT

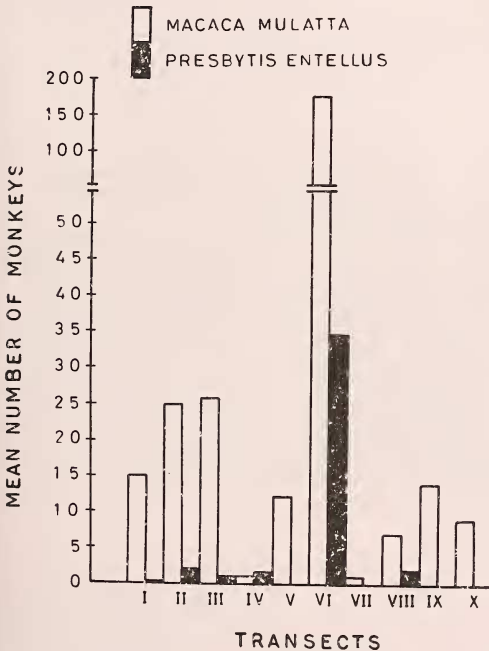


Fig. 2. Mean number of monkeys at each site.

ACKNOWLEDGEMENTS

We are thankful to Dr. Rudy Rudran, Research

Associate, NZP Washington DC and Dr. Walter Auffenberg, University of Florida, Gainesville, for training and advice.

TABLE 1  
DISTRIBUTION AND CONCENTRATION OF *Macaca mulatta* AND *Presbytis entellus* ALONG THE TRANSECTS AND ITS ASSOCIATION WITH PROVISIONING SITES

Transect No.	Area	Habitat	Concentration of rhesus and langur
1.	0.048 sq.km Chandpole to Choti Chopad	Jaggery, grain and vegetable markets; temple	Moderate
2.	0.048 sq.km Choti Chopad to Badi Chopad	Tourist area	High
3.	0.048 sq.km Badi Chopad to Ramgunj	Jaggery, vegetable and fruit markets	High
4.	0.048 sq.km Ramgunj to Surajpole	No shops selling eatables	Very low
5.	0.044 sq.km Choti Chopad to Brahampuri	No shops selling eatables	Low
6.	0.16 sq.km City Palace to Govind Deoji	City Palace; temple; high provisioning	Very High
7.	0.04 sq.km Ramgunj to Char Darwaza	No shops selling eatables	Almost nil
8.	0.04 sq.km Choti Chopad to Kishanpole	Few sweet shops	Very low
9.	0.04 sq.km Badi Chopad to Johari Bazar	Vegetable and fruit markets	Moderate
10.	0.04 sq.km Ramgunj Chopad to Ramgunj Bazar	Jaggery and grain markets	Low

#### REFERENCES

- HULL, T.G. (1955): Diseases transmitted from animals to man. Charles C. Thomas, Springfield, Ill.
- MOHNOT, S.M. (1978): Conservation of primates in India. pp. 47-53. *In*: D.J. Chivers and W. Lane Petter (eds) Recent Advances in Primatology. Vol. II Conservation, Academic Press.
- NAPIER, J.R. & NAPIER, P. H. (1967): A Handbook of Living Primates. Academic Press. New York.
- NEOMI, B., BLAFFER, HRDY, S., JANE, T. & MOORE, J. (1981): Measures of human influence in habitats of south Asian monkeys. *Int. J. of Primat.* ID 2: 153-167.
- PRAKASH, I. (1962): Group organization, sexual behaviour and breeding season of certain Indian monkeys. *Jap. J. of Ecol.* 12:83-86.
- PRATER, S.H. (1980): The book of Indian Animals. Bombay Natural History Society, Bombay.
- SOUTHWICK, C.H. & SIDDIQUI, M.F. (1983): Status and conservation of rhesus monkeys in India. pp. 227-237. *In*: P.K. Seth (ed) Perspectives In Primate Biology. Today-Tomorrow Printers and Publishers, New Delhi.
- (1984): A proposal for conservation of rhesus monkeys in agricultural habitats in northern India. pp. 553-561. *In*: Roonwal, M.L., Mohnot, S.M. & Rathore, N.S. (eds) Current Primate Researches, Department of Zoology, University of Jodhpur, India.
- WOLFE, L.D. & MATHUR, R. (1987): Monkeys of Jaipur, Rajasthan, India. *J. Bombay nat. Hist. Soc.* 84(3): 534-539.